Transactions of American Society for Metals

Volume XLVIII 1956

Ray T. Bayless Editor



Published by American Society for Metals 7301 Euclid Ave. Cleveland 3, Ohio East Engine. TS 300 . A 5 65 ts v. 48

> Copyright 1956 by the American Society for Metals Cleveland, Ohio

Contents

Technical Program and Reports of Officers, ASM 37th Annual Convention, Philadelphia, October 17 to 21, 1955	1
Low Carbon Martensites—By R. H. Aborn Edward deMille Campbell Memorial Lecture	51
Some Effects of Silicon on the Mechanical Properties of High Strength Steels— By C. H. Shih, B. L. Averbach and Morris Cohen Discussion	86 115
Some Relationships between Endurance Limit and Torsional Properties of Steel— By S. T. Ross, R. P. Sernka and W. E. Jominy	119
Discussion The Influence of Molybdenum and Tungsten on Temper Embrittlement— By A. E. Powers	139
Hardness of Tempered Martensite in Carbon and Low Alloy Steels— By R. A. Grange and R. W. Baughman Discussion	165 192
Static Fatigue of High Strength Steel— By R. H. Raring and J. A. Rinebolt Discussion	198 208
Some Effects of Metal Removal and Heat Treatment on the Surfaces of Hardened Steels— By Karl E. Beu and Donald P. Koistinen Discussion	213 230
The Influence of Tensile Stress on the Isothermal Decomposition of Austenite to Ferrite and Pearlite— By George L. Kehl and Subrata Bhattacharyya	234
Effect of Temperature on Delayed Yielding of Mild Steel for Short Loading Duration— By Joseph M. Krafft Discussion	249 261
The Optimum Boron Content for Hardenability— By J. C. Shyne, E. R. Morgan and D. N. Frey Discussion	265 272
On Banding in Steel— By C. F. Jatczak, D. J. Girardi and E. S. Rowland Discussion	279 303
An Approach to the Study of the Effect of Rare Earth Additions to Steel by Use of Radioactive Tracer Techniques— By C. S. DuMont, J. E. Gates and C. M. Henderson Discussion	306 317
Inhibition by Nitrogen of Graphitization in Steel— By G. V. Smith and B. W. Royle Discussion	320 326

Effect of Tempering Temperature on Stress-Corrosion Cracking and Hydrogen Embrittlement of Martensitic Stainless Steels— By Peter Lillys and A. E. Nehrenberg Discussion	327 347
Austenitic Fe-Cr-C-N Stainless Steels— By G. F. Tisinai, J. K. Stanley and C. H. Samans Discussion	356 366
Notch Ductility Of Type 410 (12% Cr) Stainless Steel— By F. A. Brandt, H. F. Bishop and W. S. Pellini Discussion	368 390
Influence of Alloying Elements on the Impact Transition Behavior of 12% Chromium Steels Aged at 900 °F— By E. J. Whittenberger and E. R. Rosenow Discussion	391 414
The Effect of Composition and Structure on the Creep-Rupture Properties of 18-8 Stainless Steels— By Forest C. Monkman, Peter E. Price and Nicholas J. Grant Discussion	418 444
Creep-Rupture Properties of Cold-Worked Type 347 Stainless Steel— By N. J. Grant, Albert G. Bucklin and Warren Rowland Discussion	446 455
Effects of Chemical Composition and Heat Treatment Upon the Microstructure and Corrosion Resistance of AISI Types 309 and 310—By D. J. Carney and E. R. Rosenow	456 472
The Influence of Strain Rate and Temperature on the Ductility of Austenitic Stainless Steel— By G. W. Form and W. M. Baldwin, Jr	474
Room and Elevated Temperature Mechanical Properties of AISI Type 414 and Type 431 Stainless Steels— By E. J. Dulis, S. J. Parker and P. W. Marshall Discussion	486 505
High Nitrogen Austenitic CR-MN Steels— By V. F. Zackay, J. F. Carlson and P. L. Jackson Discussion	509 520
Rolling Textures in Tantalum— By J. W. Pugh and W. R. Hibbard, Jr	526
The Initiation of Discontinuous Yielding in Ductile Molybdenum— By J. A. Hendrickson, D. S. Wood and D. S. Clark Discussion	540 558
The Mechanical Properties of Vanadium-Base Alloys— By W. Rostoker, A. S. Yamamoto and R. E. Riley	560
Properties of Vanadium Consolidated by Extrusion— By C. E. Lacy and C. J. Beck Discussion	579 5 93
Fabrication and Evaluation of Thin Clad Sheets of Molybdenum— By M. H. LaChance and R. I. Jaffee Discussion	595 620

Mechanical Properties of Ti-Cr-Mo Alloys as Affected by Grain Size and Grain Shape—	
By H. R. Ogden, F. C. Holden and R. I. Jaffee Discussion	627 655
Investigation of the Heat Treatability of the 6% Aluminum-	
4% Vanadium Titanium-Base Alloy— By R. G. Sherman and H. D. Kessler Discussion	657 671
Temperature Dependence of the Tensile Properties of Tantalum— By J. W. Pugh	677
Phase Relations in Magnesium—Lithium—Aluminum Alloys— By D. W. Levinson and D. J. McPherson	689
The Constitution of Indium-Arsenic-Antimony Alloys— By C. H. Shih and E. A. Peretti Discussion	706 725
Hydrogen Contamination in Descaling and Acid Pickling of Titanium— By G. A. Lenning, C. M. Craighead and R. I. Jaffee Discussion	726 733
The Rate of Diffusion of Carbon in Alpha and Beta Titanium— By F. C. Wagner, E. J. Bucur and M. A. Steinberg Discussion	742 761
Metallography of Tempering of Alpha-Prime in Titanium Alloys— By R. F. Domagala and W. Rostoker Discussion	762 772
Nature and Decomposition Kinetics of Alpha Prime in Titanium-Vanadium Alloys— By F. R. Brotzen, E. L. Harmon and A. R. Troiano	774
Approximate Phase Relationships in the Titanium-Vanadium-Aluminum System at 1800 °F and at 1400 °F.— By Charles B. Jordan and Pol Duwez	783 794
Elevated Temperature Strength of Selected Zirconium-Base Alloys— By R. J. Van Thyne and D. J. McPherson	795 803
Progress in the Development of Creep-Resistant Zirconium Alloys— By W. Chubb Discussion	804 821
Tensile Properties of Zirconium-Chromium Alloys—Particle-Strengthening Effects— By J. H. Keeler. Discussion	825 842
Zirconium-Germanium Alloy System— By O. N. Carlson, P. E. Armstrong and H. A. Wilhelm	843
Phase Relations in Mg-Li-Zn Alloys— By A. F. Weinberg, D. W. Levinson and W. Rostoker	855
Fatigue and Anisotropy in Copper— By M. L. Ebner and W. A. Backofen	872

The Influence of Vibration on the Solidification of an Aluminum Alloy— By R. S. Richards and W. Rostoker	884 900
The Intermetallic Phases in 2024 Aluminum Alloy— By Philip R. Sperry	904
Grain Boundary Creep in Aluminum Bicrystals— By F. N. Rhines, W. E. Bond and M. A. Kissel Discussion	919 945
Influence of Cold Work on Strength of Steel at Elevated Temperatures— By Paul Shahinian Discussion	952 967
Notch Ductile High Strength Nodular Irons— By G. A. Sandoz, H. F. Bishop and W. S. Pellini	971
Deformation and Fracture Mechanisms of Polycrystalline Magnesium at Low Temperatures— By F. E. Hauser, P. R. Landon and J. E. Dorn Discussion	986 1001
Deformation of Beryllium Single Crystals at 25 to 500 °C.— By H. T. Lee and R. M. Brick	1003 1037

1 5

AMERICAN SOCIETY for METALS

Officers and Trustees

A. O. SCHAEFER, President Midvale Company, Philadelphia

C. H. LORIG, Treasurer Battelle Memorial Institute, Columbus

DONALD S. CLARK, Vice President California Institute of Technology Pasadena, California

W. H. EISENMAN, Secretary 7301 Euclid Avenue, Cleveland

Trustees

GEORGE A. ROBERTS, Past President Vanadium-Alloys Steel Co., Latrobe, Pa.

WALTER CRAFTS Union Carbide & Carbon Research Labs. Niagara Falls, New York

G. E. SHUBROOKS
Hamilton Watch Company, Lancaster, Pa.

H. A. WILHELM
Iowa State College, Ames, Iowa

KARL L. FETTERS Youngstown Sheet & Tube Co. Youngstown, Ohio

PAST PRESIDENTS

ALBERT E. WHITE 1921	W. P. WOODSIDE 1939
Frank P. Gilligan 1922	J. P. GILL
*TILLMAN D. LYNCH	O. E. HARDER
*George K. Burgess1924	Bradley Stoughton 1942
*WILLIAM S. BIDLE	*H. J. French
*Robert M. Bird	*M. A. GROSSMANN
J. FLETCHER HARPER1927	K. R. VAN HORN
FREDERICK G. HUGHES 1928	*C. H. HERTY, JR1946
ZAY JEFFRIES	A. L. Boegehold
*R. G. GUTHRIE 1930	Francis B. Foley1948
J. M. WATSON	H. K. Work
A. H. D'ARCAMBAL	A. E. FOCKE
WILLIAM B. COLEMAN	W. E. JOMINY
*WILLIAM H. PHILLIPS	JOHN ČHIPMAN
B. F. Shepherd	RALPH L. WILSON
R. S. Archer	JAMES B. AUSTIN
E. C. Bain	George A. Roberts1955
*G. B. WATERHOUSE1938	

FOUNDER MEMBERS

*Theodore E. Barker *Arthur G. Henry William P. Woodside, Detroit Albert E. White, Ann Arbor W. H. Eisenman, Cleveland

HONORARY MEMBERS

11011011111	211221122212
*Charles F. Brush, Sc. D *Edward DeMille Campbell *Henry Le Chatelier *Thomas Alva Edison, Sc. D Benjamin F. Fairless	ZAY JEFFRIES, Sc. D CHARLES F. KETTERING *JOHN ALEXANDER MATHEWS, Sc. D *ALBERT SAUVEUR, Sc. D *CHARLES M. SCHWAB.
*JUDGE ELBERT H. GARY	WILLIS R. WHITNEY, Ph. D
*SIR ROBERT HADFIELD, Bart., F. R. S.	CECIL H. DESCH, Ph. D., F. R. S
*ELWOOD HAYNES	ALBERT E. WHITE, Sc. D
KOTARO HONDA, Sc. D	ALBERT PORTEVIN
*HENRY MARION HOWE, Sc. D	BRADLEY STOUGHTON
AXEL HULTGREN	PAUL D. MERICA, Ph. D

^{*}Deceased.

AMERICAN SOCIETY for METALS

HENRY MARION HOWE MEDALISTS

111214141	MIZERIOI I	IOWE MILEDA	LIGIO
E. J. Janitzky F. F. Lucas H. H. Lester *F. C. Langenberg W. P. Sykes O. E. Harder, R. L. Dow *C. R. Wohrman H. J. French E. C. Bain, K. Heindlh F. M. Walters, Cyril. M. Gensamer, J. F. E. J. V. Emmons John Chipman *T. D. Yensen, N. A. Zie A. G. H. Andersen, E. R. J. Winlock, R. W. E. Le C. S. Barrett, G. Ansei R. F. Mehl *M. A. Grossmann, M. and S. F. Urban W. A. Schlegel		CHIPMAN. R. A. FLINE and J. A. D. P. ANTIA and MORI C. R. AUSTI W. A. PENN J. W. SPRET B. L. AVERE and S. G. W. O. BIND and RUSS B. J. LAZAN E. M. MAHI NIELSEN L. F. PORTE ROSENTH H. J. BEAT VER SNYI A. E. NEHI	MARSHALL and JOHN
			VARD
*Albert Sauveur. 1934 Zay Jeffries 1935 W. R. Chapin 1936 H. W. McQuaid 1938 *S. P. Rockwell 1939 A. W. Machlet 1940 *A. L. Marsh 1941	*C. H. HERT W. E. JOMI R. S. ARCH E. C. BAIN	ER1944 ER1945 1946 ERLI1947	C. E. SIMS
G	OLD MEDA	L OF A. S. M	I.
ZAY JEFFRIES EARLE C. SMITH CHAMPION H. MATHEWSON FRANCIS COWLES FRARY. EDGAR COLLINS BAIN:	1943 1945 N1947 1948	PAUL D. ME ROBERT F. M GEORGE SAC	RICA. 1951 MEHL 1952 HS 1953 HOLD 1955
A. S. M. MEDAL F	OR THE AL	OVANCEMEN	NT OF RESEARCH
ROY ARTHUR HUNT *ROBERT CROOKS STANLEY GERARD SWOPE R. E. ZIMMERMAN CHARLES R. HOOK *WILLARD HENRY DOW FRED H. HAGGERSON	Y	GWILYM A. CLEO F. CR HILAND G. WILLIAM E.	. Wilson
CAMPI	BELL MEMO	DRIAL LECT	URERS
W. M. Guertler 1926 Zay Jeffries 1927 *W. H. Hatfield 1928 *Albert Sauveur 1929 *M. A. Grossmann. 1930 *C. H. Herty, Jr 1931 Edgar C. Bain 1932 *H. J. French 1933 V. N. Krivobok 1934 H. W. McQuaid 1935	James P. Gi Wesley P. S A. L. Boege E. S. Daven Samuel L. F Robert F. M John Chipm C. H. Math G. R. Fitter	ill	James B. Austin 1946 A. B. Kinzel 1947 Morris Cohen 1948 Edgar H. Dix, Jr 1949 Earle C. Smith 1950 Clarence H. Lorig 1951 Cyril S. Smith 1952 Donald S. Clark 1953 Kent R. VanHorn 1954 Robert H. Aborn 1955
*Deceased.			

^{*}Deceased

AMERICAN SOCIETY for METALS

Standing Committees

FINANCE COMMITTEE

C. H. LORIG, Chairman Battelle Memorial Institute Columbus, Ohio Members:
Clyde Williams, Columbus, '56
A. B. Kinzel, New York, '56
A. A. Hess, Cleveland, '56
F. R. Morral, Inland Empire, '56
Erith T. Clayton, Baltimore, '57
Bob Daykin, Milwaukee, '57
Zay Jeffries, Cleveland, '57
K. R. Van Horn, Pittsburgh, '58

CONSTITUTION AND BY-LAWS COMMITTEE

R. E. LAYTON, Chairman, '56 O. A. Sutton Corp. Wichita, Kans. Members:
W. Mack Crook, Texas, '56
Martin E. Huether, St. Louis, '57
G. M. Snyder, Northeast Pennsylvania, '57
D. W. Thompson, West Michigan, '56
Kenneth Mackenzie, Southern Tier, '58
William F. Eberly, Philadelphia, '58
G. E. Shubrooks, Rep. of ASM Board of Trustees

ASM PUBLICATIONS COMMITTEE

D. J. CARNEY, Chairman, '56 United States Steel Corp. Chicago, Illinois

RAY T. BAYLESS, Secretary 7301 Euclid Avenue Cleveland 3, Ohio Members:
H. S. Avery, New York, '56
Peter Payson, Pittsburgh, '56
James Wyatt, Cleveland, '56
W. D. Manly, Oak Ridge, '56
R. D. Chapman, Detroit, '56
G. W. Birdsall, Louisville, '57
H. J. Elmendorf, Worcester, '57
Glenn A. Fritzlen, Purdue, '57
J. F. Libsch, Lehigh Valley, '57
R. I. Jaffee, Columbus, '57
George Enzian, Pittsburgh, '58
H. Y. Hunsicker, Cleveland, '58
William A. Reich, Detroit, '58
Daniel J. Girardi, Canton, '58
Paul G. Nelson, Philadelphia, '58

METALS HANDBOOK COMMITTEE

N. E. PROMISEL, Chairman, '56 Navy Department Bureau of Aeronautics Washington, D. C.

TAYLOR LYMAN, Secretary 7301 Euclid Avenue Cleveland 3, Ohio Members:
F. R. Anderson, Denver, '56
W. L. Badger, Boston, '56
E. O. Dixon, Milwaukee, '56
M. L. Frey, Milwaukee, '57
S. R. Callaway, Chicago, '57
T. A. Frischman, Cleveland, '57
Ralph Leiter, Philadelphia, '57
George Perkins, Louisville, '57
C. W. Briggs, Cleveland, '57
Arthur R. Oakley, Texas, '57
G. F. Kappelt, Buffalo, '58
F. T. McGuire, Tri-City, '58
J. J. Repko, Cleveland, '58

EDUCATIONAL COMMITTEE

W. T. Lankford, Chairman, '56 U. S. Steel Corp., Pittsburgh, Pa.

RAY T. BAYLESS, Secretary 7301 Euclid Avenue Cleveland 3, Ohio Members: R. S. Guinan, Rochester, '56 H. J. Smith, Louisville, '56 D. J. Blickwede, Lehigh Valley, '57 Melvin R. Meyerson, Washington, '57 A. U. Seybolt, Eastern New York, '57 Scott Henry, Milwaukee, '58 Richard Doughton, Pittsburgh, '58 D. H. Runke, Canton-Massillon, '58

METAL PROGRESS ADVISORY COMMITTEE

E. E. Thum, Editor
A. O. Schaefer, President
Donald S. Clark, Vice President
W. H. Eisenman, Secretary
Ray T. Bayless, Assistant Secretary

Members:
Frank G. Foote, Chicago, '56
H. J. Nichols, Otiawa, '57
Don Rosenblatt, Salt Lake City, '57
Leo P. Tarasov, Worcester, '57
G. M. Young, Montreal, '58
John W. Sweet, Puget Sound, '58

The numerals following each committeeman's name indicate that his term of office on that committee expires at the close of the annual meeting of the Society of the year expressed.

ADVISORY COMMITTEE ON METALLURGICAL EDUCATION

G. A. FISHER, JR., Chairman, '56 International Nickel Co., St. Louis, Mo. Members:
H. E. Flanders, Utah, '56
E. E. Stansbury, Oak Ridge, '56
Morris Cohen, Boston, '57
Robert F. Hehemann, Cleveland, '57
J. W. Ludewig, Pittsburgh, '57
J. U. MacEwan, Montreal, '57
Kenneth E. Rose, Kansas, '58
Robert Sweet, West Michigan, '58
A. W. Grosvenor, Philadelphia, '58
C. W. Mason, So. Tier, '58
H. A. Wilhelm, Representative of ASM Board of Trustees

SEMINAR COMMITTEE

P. A. BECK, Chairman, '56 University of Illinois Urbana, Illinois Members:
O. T. Marzke, Washington, '56
R. L. Cunningham, Ottawa Valley, '56
Eric Jette, Los Alamos, '56
R. Maddin, Philadelphia, '56
Arthur S. Nowick, New Haven, '56
B. Averbach, Boston, '57
Bruce Chalmers, Boston, '57
John Fischer, Eastern New York, '57
Thornton Read, Jr., Murray Hill, N. J., '57
J. S. Koehler, Urbana, '58
M. B. Bever, Boston, '58
Pol Duwez, Los Angeles, '58

VOCATIONAL EDUCATION COMMITTEE

T. J. HUGHEL, Chairman, '56 Purdue University, Lafayette, Indiana Members:
M. J. Weldon, New Haven, '56
W. F. Collins, Boston, '56
O. E. Cullen, Toledo, '57
Albert R. Fairchild, Jr., Carolinas, '57
W. E. Frank, Peoria, '57
Jacob Gantner, Dayton, '57
E. L. Bartholomew, Jr., Hartford, '58
Elmer Gammeter, Milwaukee, '58
Joseph Gurski, Detroit, '58
C. A. Higgerson, Rome, '58
G. A. Fisher, Jr. (Ex-Officio), '56
Karl Fetters, Representative of ASM Board of Trustees

PAST-CHAIRMEN OF PUBLICATIONS COMMITTEE

*Herbert M. Boylston	29 R. M. Brick
William B. Coleman 1929-	30 Walter Crafts
Victor O. Homerberg	32 A. O. Schaefer
Augustus B. Kinzel1932-	33 R. H. Aborn
Gerald R. Brophy	
Wesley P. Sykes	
A. Allan Bates	
*Louis W. Kempf	
M. Gensamer	
*E. G. Mahin	
Clair Upthegrove	45

PAST-CHAIRMEN OF EDUCATIONAL COMMITTEE

Reid L. Kenyon	H. B. Knowlton
William J. Conley	J. F. Kahles
A. Allan Bates	K. L. Fetters
C. W. Mason	N. J. Grant
J. O. Lord	M. J. Day
John T. Norton	F. G. Tatnall
C. R. Austin	C. H. Lorig

PAST-CHAIRMEN OF METALS HANDBOOK AND PREDECESSOR COMMITTEES

*Tillman D. Lynch	22 James P. Gill
*Robert M. Bird	23 Ralph L. Dowdell
J. Fletcher Harper	27 Robert S. Archer
*William J. Merten	31 G. V. Luerssen
L. B. Case	-33 J. B. Johnson
*Charles H. Herty, Ir. 1933-	-36 E. O. Dixon 1952-54

*Deceased.

The numerals following each committeeman's name indicate that his term of office on that committee expires at the close of the annual meeting of the society of the year expressed.

Chapters and Officers

AKRON CHAPTER

Arthur R. Nasrallah, Chairman, 2233—25th St., S. W. Akron 14, Ohio

STEPHEN H. FINLEY, Secretary, 292 Portage St. Doylestown, Ohio

W. A. Schaefer, Treasurer, 2470-24th St. Cuyahoga Falls, Ohio

ALBERTA CHAPTER

Otto Kingsep, Chairman, 3611—1st St. S. W. Calgary, Alberta W. C. Rowe, Secretary-Treasurer, Crane Limited P.O. Box 58 Calgary, Alberta

ALBUQUERQUE CHAPTER

KEITH E. MEAD, Chairman, 1848 Florida, N. E. Albuquerque, N. M.

Ben F. Blythe, Secretary, 4770 Southern Ave., S. E. Albuquerque, N. M.

ARTHUR W. PORTER, Treasurer, 2501 Vista Larga Ave., N. E. Albuquerque, N. M.

BALTIMORE CHAPTER

E. TAINTON CLAYTON, Chairman, The Tainton Co. 3100 Elm Ave. Baltimore 11, Md.

DONALD W. KALKMAN, Secretary-Treasurer, 408 Evesham Ave. Baltimore 12, Md.

BIRMINGHAM CHAPTER

RALPH CARLSON, Chairman, 2124 Rockland Dr. Bluff Park Birmingham 9, Ala.

Sanford P. Enslen, Jr., Secretary-Treasurer, 1530 Bush Blvd. Birmingham 4, Ala.

BOSTON CHAPTER

JOHN L. MOROSINI, Chairman, 298 Highland St. Milton, Mass.

JOHN D. PAINE, JR., Secretary-Treasurer, 1 Doane St. Marblehead, Mass.

BRITISH COLUMBIA CHAPTER

J. STOKES, Chairman, Throwaway Bit Co., Ltd. 1651 Franklin St. Vancouver 6, B. C.

CHARLES CUMMING, Secretary, A. C. Wickman, Ltd. 193 E. Hastings St. Vancouver, B. C.

Francis W. Norman, Treasurer, B. C. Marine Engineer & Shipbuilders Ltd. Ft. of Victoria Dr. Vancouver, B. C.

BUFFALO CHAPTER

Silas M. Brown, Chairman, 20 Colonial Dr. Snyder 21, N. Y.

EMIL M. GALBREATH, Secretary, 198 Parkwood Ave. Kenmore 17, N. Y.

CHARLES W. HART, Treasurer, Republic Steel Corp. Donner Division 1175 South Park Ave. Buffalo 5, N. V.

CALUMET CHAPTER

JOHN A. RASSENFOSS, Chairman, 3520 Condit St. Highland, Ind.

EARL K. PHARES, Secretary, 6534 Monroe St. Hammond, Ind.

Thomas A. Foss, Treasurer, 4123 Dearborn St. East Chicago, Ind.

CANTON-MASSILLON CHAPTER

G. W. HINKLE, Chairman, 2214 Washington Blvd., N. W. Canton 3, Ohio

L. A. Zeitz, Secretary, East Ohio Gas Co, Canton, Ohio

G. Brainard Trumble, Treasurer, 2018 Fulton Rd., N. W. Canton, Ohio

CAROLINAS CHAPTER

H. F. BLACKWOOD, JR., Chairman, 505 Miller St. Winston-Salem, N. C.

R. J. POLIVKA, Secretary, 2420 Cherokee Lane Winston-Salem, N. C.

James L. Highsmith, Treasurer, P. O. Box 1011 Charlotte 1, N. C.

CEDAR RAPIDS CHAPTER

R. H. TRIEM, Chairman, Cherry-Burrell Corp. 2400—6th St., S. W. Cedar Rapids, Iowa

George H. Taylor, Secretary-Treasurer, 1500 Oakland Rd., N. E. Cedar Rapids, Iowa

CHATTANOOGA CHAPTER

Walter A. Neisz, Chairman, 3606 Wimberly Lane Chattanooga 1, Tenn.

LeWayne N. Wall, Secretary-Treasurer, 800 South Moore Rd. Chattanooga 4, Tenn.

CHICAGO CHAPTER

CARL H. SAMANS, Chairman, Standard Oil Co. (Indiana) 2400 New York Ave. Whiting, Ind.

J. H. GREENBERG, Secretary-Treasurer, A. J. Boynton & Co. 109 North Wabash Ave. Chicago 2

CHICAGO CHAPTER-JUNIOR GROUP

ARTHUR F. LUKOWICZ, Chairman, 5521 Higgins Chicago 30

Peter Dowbor, Secretary, 5544 Woodlawn Ave. Chicago 37

John L. Driscoll, Jr., Treasurer, 1265 Early Chicago 40

CINCINNATI CHAPTER

Fred Westermann, Chairman, Dept. of Met. Eng. University of Cincinnati Cincinnati 21

F. C. ROBERTSHAW, JR., Secretary, 8715 Monsanto Dr. Cincinnati 31

Albert J. Pfetzing, Treasurer, 140 Kinsey Ave. Cincinnati 19

CLEVELAND CHAPTER

CHARLES H. JUNGE, Chairman, 2436 Eaton Rd. Cleveland 18

K. J. HUMBERSTONE, Secretary, American Tank & Fabricating Co, 2284 Scranton Rd. Cleveland, Ohio

Charles H. Campbell, Treasurer, 116 Wandle Ave. Bedford, Ohio

COLUMBIA BASIN CHAPTER

WILLIAM R. SMITH, Chairman, 1206 Cedar Ave. Richland, Wash.

Morris J. Sanderson, Secretary, 1013 Willard Ave. Richland, Wash.

RICHARD B. SOCKY, Treasurer, General Electric Co. Bldg. 760, Rm. 119 Richland, Wash.

COLUMBUS CHAPTER

J. HARRY JACKSON, Chairman, Battelle Memorial Institute 505 King Ave. Columbus, Ohio

R. E. CHRISTIN, Secretary, Electric Heat Treating Co. Main P. O. Box 1115 Columbus 16, Ohio

Francis W. Boulger, Treasurer, Battelle Memorial Institute 505 King Ave. Columbus 1, Ohio

DAYTON CHAPTER

HAROLD J. REINDL, Chairman, 3506 Cleveland Ave. Dayton 10, Ohio

WILLIAM T. BRYAN, Secretary, 10 Winding Way Dayton 9, Ohio

ROBERT P. UHL, Treasurer, Carpenter Steel Co. 229 Leo St. Dayton 4, Ohio

DES MOINES CHAPTER

C. S. RUTHERFORD, Chairman, R & R Welding Supply 315—12th Des Moines, Iowa

M. L. Patzig, Jr., Secretary-Treasurer, Patzig Testing Laboratories 2215 Ingersoll Ave. Des Moines, Iowa

DETROIT CHAPTER

A. D. WAGNER, Chairman, 531 W. Oak Ridge Ferndale 20, Mich.

R. D. Chapman, Secretary-Treasurer, 1120 N. Glenhurst Dr. Birmingham, Mich.

EASTERN NEW YORK CHAPTER

WALTER R. HIBBARD, JR., Chairman, 2213 Almeria Rd. Schenectady 9, N. Y.

WILLIAM PILTMAN, Secretary, Works Laboratory Bldg. 6, General Electric Co. Schenectady, N. Y.

Mrs. C. B. Craver, Treasurer, Dunn Garden Apts. Bldg. B-C 281 Hoosick St. Troy, N. Y.

EDMONTON CHAPTER

Warren D. Suitor, Chairman, 1342 Montreal Ave. Calgary, Alberta

GLYN HARRIS, Secretary, Anthes Imperial Co., Ltd. 9250—125th Ave. Edmonton, Alberta

HERB BEAR, Treasurer, 9626—90th St. Edmonton, Alberta

FORT WAYNE CHAPTER

Fred K. Jaessing, Chairman, 5710 Alexander Dr. Ft. Wayne 5, Ind.

Andrew Van Echo, Secretary, Joslyn Manufacturing & Supply Co. 1701 McKinley Ave. Ft. Wayne, Ind.

George R. Hemmeter, Treasurer 4757 Holton Ave. Ft. Wayne, Ind.

GEORGIA CHAPTER

A. RICHARD BOYD, Chairman, Carpenter Steel Co., 740 Bluff St., S. W. Atlanta, Ga.

MICHAEL F. WIEDL, Secretary, P. O. Box 1714 Atlanta 1, Ga.

WRIGHT T. PAULK, Treasurer, 53 Huntington Rd., N. E. Atlanta, Ga.

GOLDEN GATE CHAPTER

M. VICTOR WALBERG, Chairman, 3925 Canyon Rd. Lafayette, Calif.

H. E. Krayenbuhl, Secretary, Dorr Oliver Inc. 2900 Glascock St. Oakland 1, Calif.

Ernest W. Milburn, Treasurer, 3090 Holyrood Dr. Oakland 11, Calif.

HARTFORD CHAPTER

THOMAS P. HANFORD, Chairman, 463 Percival Ave. Kensington, Conn.

EDWARD B. BARTEK, Secretary-Treasurer, 60 Round Hill Rd. Mt. Carmel, Conn.

INDIANAPOLIS CHAPTER

WAYNE H. GLOVER, Chairman 6402 Maple Dr. Indianapolis 20, Ind.

George J. Shubat, Secretary, Box 91 Zionsville, Ind.

W. E. Ellsworth, Treasurer, Room 211 31 East Georgia Indianapolis 4, Ind.

INLAND EMPIRE CHAPTER

Amon L. Groves, Chairman, E. 2604 Columbia Spokane 14, Wash.

Thomas J. Summerson, Secretary-Treasurer, N. 1106 Felts, Dishman Br. Spokane 62, Wash.

JACKSONVILLE CHAPTER

Joe F. Campbell, Chairman, 1446 River Bluff Rd. Arlington, Fla.

Stephen M. Bowes, Jr., Secretary-Treasurer, 1950 Thacker Ave. Jacksonville 7, Fla.

KANSAS CITY CHAPTER

R. R. GRINER, Chairman, 6745 Fontana Ave. Prairie Village, Kan.

C. Gerald Hummon, Secretary, Sheffield Steel Corp. Kansas City 25, Mo.

WILLIAM H. DETERDING, Treasurer, 7119 Virginia Ave. Kansas City 10, Mo.

LEHIGH VALLEY CHAPTER

CARL B. POST, Chairman, Carpenter Steel Co. Reading, Pa.

JOHN F. CLARK, Secretary, 1527 Kaywin Ave. Bethlehem, Pa.

Leon J. McGeady, Treasurer, Dept. of Met. Eng. Lafayette College Easton, Pa.

LONG ISLAND CHAPTER

HERBERT S. KALISH, Chairman, Sylvania Electric Products Inc. Bayside, L. I., N. Y.

HAROLD M. McCullough, Secretary, Sylvania Electric Products Inc. P. O. Box 59 Bayside, L. I., N. Y.

R. M. PLATZ, Treasurer, Fairchild Engine Division Conklin St. Farmingdale, L. I., N. Y.

LOS ALAMOS CHAPTER

ROBERT T. PHELPS, Chairman, 776—47th St. Los Alamos, N. M.

FRED W. SCHONFELD, Secretary-Treasurer, P. O. Box 1663 Los Alamos, N. M.

LOS ANGELES CHAPTER

ROY E. PAINE, Chairman, 919 East Philadelphia Whittier, Calif.

JOHN E. WILSON, Secretary, ASM-1007 Brockman Bldg. 520 W. 7th St. Los Angeles 14

Howard N. Farmer, Jr., Treasurer, International Nickel Co. 714 West Olympic Los Angeles

LOUISVILLE CHAPTER

CARL L. OWEN, JR., Chairman, 2823 Whiteway Ave. Louisville, Ky.

HENRY F. KELLER, JR., Secretary-Treasurer, 1715 Culbertson Ave. New Albany, Ind.

LOUISVILLE—UNIVERSITY OF KENTUCKY CHAPTER

James A. Burka, Chairman, 403 N. Harding St. Danville, Ky.

ROBERT J. HOAG, Secretary-Treasurer, 447 Columbia Ave. Lexington, Ky.

MAHONING VALLEY CHAPTER

PAUL T. KELLEY, Chairman, 75 Woodrow Youngstown, Ohio

John D. Anderson, Jr., Secretary-Treasurer, 315 East Avondale Ave. Youngstown 7, Ohio

MANITOBA CHAPTER

ALEX GERRARD, Chairman, Atlas Steels Ltd. Ellice & Berry Sts. Winnepeg, Manitoba

S. R. Channing, Secretary-Treasurer, 198 Aubrey St. Winnipeg, Manitoba MICHIGAN COLLEGE OF MINING AND TECHNOLOGY CHAPTER

Edward J. Koepel, Chairman, Box 438 Hubbell, Mich.

PAUL D. DEELEY, Secretary-Treasurer, 511 Hancock Hancock, Mich.

MILWAUKEE CHAPTER

George J. Barker, Chairman, University of Wisconsin 1509 University Ave. Madison 6, Wis.

Ernest G. Guenther, Secretary-Treasurer, 3336 North Downer Ave. Milwaukee 11

MINNESOTA CHAPTER

M. F. Love, Chairman, Strong-Scott Manufacturing Co. 451 Taft St., N. E. Minneapolis 13, Minn.

MISS LILLIAN K. POLZIN, Secretary-Treasurer, Hennepin Ave. at Groveland Terr. Minneapolis 5, Minn.

MISSOURI SCHOOL OF M. & M. CHAPTER

ROBERT L. NAUERT, Chairman Department of Metallurgy Missouri School of Mines & Metallurgy Rolla, Missouri

HARRY DWAYNE HAYS, Secretary, Department of Metallurgy Missouri School of Mines & Metallurgy Rolla, Missouri

Robert W. Becker, Treasurer,
Department of Metallurgy
Missouri School of Mines & Metallurgy
Rolla, Missouri

MONTREAL CHAPTER

JASON J. WALLER, Chairman, Apt. 402 5051 Clanranald Ave. Montreal, Quebec

H. NEVILLE MASON, Secretary, P. O. Box 371 Station "H" Montreal, Quebec

WILLIAM S. WHITE, Treasurer, 100 Easton Montreal West 28, Quebec

MUNCIE CHAPTER

PAUL R. LEWIS, Chairman, 2012 Fairmont Ave. New Castle, Ind.

ROBERT M. MATHEWS, Secretary-Treasurer, 918 South 17th St. New Castle, Ind.

NEW HAVEN CHAPTER

Maur J. Weldon, Chairman, Northeastern Steel Corp. Bridgeport 7, Conn.

ROY C. RAYMOND, Secretary, 201 Castle Dr. Stratford, Conn.

H. O. SEELEY, Treasurer, 92 Home Acres Ave. Milford, Conn. NEW JERSEY CHAPTER

RAYMOND A. GRANGE, Chairman, U. S. Steel Research Laboratories Lincoln Hwy. Kearney, N. J.

HENRY F. J. SKARBEK, Secretary, 2038 Pleasant Pkwy. Union, N. J.

RICHARD W. THORNE, Treasurer, 43 Hillside Ave. Caldwell, N. J.

NEW ORLEANS CHAPTER

PAUL K. RAIFORD, Chairman, 2109 Robin St. New Orleans 22, La.

S. L. Kennedy, Secretary, 6773 Canal Blvd. New Orleans 24, La.

VINCENT J. LIBERTO, Treasurer, 1740 Marengo St. New Orleans 15, La.

NEW YORK CHAPTER

John P. Nielsen, Chairman, New York University University Heights New York 53, N. Y.

Ludwig Anselmini, Secretary, Foster Wheeler Corp. 165 Broadway New York 6, N. Y.

Frank D. Malone, Treasurer, 407 Bergen Blvd. Oradell, N. J.

NEW YORK UNIVERSITY STUDENT GROUP CHAPTER

JOHN F. BREEDIS, Chairman, 530 West 163rd St. New York 32, N. Y.

NEW YORK—POLY. INST. OF BROOKLYN GROUP CHAPTER

JOHN J. PALENCHAR, Chairman, 36 Sidney Place Brooklyn 2, N. Y.

Marshall Brodsky, Secretary, 106 Rockaway Parkway Brooklyn 12, N. Y.

Frederick M. Pressman, Treasurer, 271 Moore Ave. Freeport, N. Y.

NORTHERN ONTARIO CHAPTER

C. C. Benton, Chairman, 111 Stanley St. Sault Ste. Marie, Ont.

H. E. WILSON, Secretary, c/o Algoma Steel Corp., Ltd. Sault Ste. Marie, Ont.

R. H. BABER, Treasurer, 961 Wellington St., E. Sault Ste. Marie, Ont.

NORTH TEXAS CHAPTER

IRVING H. COMROE, Chairman, 4206 Gloster Rd. Dallas, Tex.

ALBERT S. HOLBERT, Secretary, Emsco Mfg. Co. D & B Div. Garland, Tex.

C. E. Perkins, Treasurer, Superior Heat Treating Co. 212 West Ramsey, P. O. Box 2094 Ft. Worth, Tex.

NORTHEASTERN PENNSYLVANIA CHAPTER

- JOHN J. PENKOSKE, Chairman, 129 Briarcliff Rd, Berwick, Pa.
- Frank R. Yurkoski, Jr., Secretary-Treasurer, Main St. Mocanaqua, Pa.

NORTHWESTERN PENNSYLVANIA CHAPTER

- E. E. HALL, Chairman, 319 West Walnut St. Titusville, Pa.
- G. E. Mohnkern, Secretary-Treasurer, Henrys Bend, Star Route Oil City, Pa.

NOTRE DAME CHAPTER

- JACK D. ROBINSON, Chairman, 1349 East Monroe South Bend, Ind.
- ETTORE A. PERETTI, Secretary-Treasurer, University of Notre Dame Dept. of Met., Box 145 Notre Dame, Ind.

OAK RIDGE CHAPTER

- William J. Fretague, Chairman, 306 East Forest Lane Oak Ridge, Tenn.
- WILLIAM OTTO HARMS, Secretary, 332 East Dr. Oak Ridge, Tenn.
- W. S. Dritt, Treasurer, 103 Euclid Place Oak Ridge, Tenn.

OLD SOUTH CHAPTER

- G. H. BALLENTINE, JR., Chairman, Precision Machine Works, Inc. Box 535 Greenville, S. C.
- A. H. Agnew, Secretary-Treasurer, Greenville Steel & Foundry Co. P. O. Box 1199 Greenville, S. C.

ONTARIO CHAPTER

- E. G. JENNINGS, Chairman, Metals & Alloys Ltd. Wicksteed Ave. Leaside 12, Ontario
- A. L. MACKAY, Secretary, 20 Lumley Ave. Toronto, Canada
- J. HOWARD POPE, Treasurer, Imperial Oxygen Co., Ltd. 565 Tretheway Dr. Toronto, Ontario

OREGON CHAPTER

- J. E. GUSTAFSON, Chairman,
 Bethlehem Pacific Coast Steel Corp.
 508 Pacific Bldg.
 Portland 4, Ore.
- Theodore B. Mathisen, Secretary-Treasurer, 505—37th St. Milwaukie 22, Ore.

OTTAWA VALLEY CHAPTER

- N. B. Brown, Chairman, 31 Orrin Ave. Ottawa, Ontario
- DAVID E. PARSONS, Secretary-Treasurer, Physical Metallurgy Research Div. 568 Booth St. Ottawa, Ontario

PENN STATE CHAPTER

- MICHAEL J. MINAULLI, Chairman, 118 East Curtin St. Bellefonte, Pa.
- ROBERT W. LINDSAY, Secretary-Treasurer, Prof. of Metallurgy Pennsylvania State University University Park, Pa.

PEORIA CHAPTER

- RICHARD H. VANPELT, Chairman, 604 Terrace Court Washington, Ill.
- JOHN M. St. John, Secretary-Treasurer, 622 Fondulac Dr. East Peoria, Ill.

PHILADELPHIA CHAPTER

- John P. Clark, Jr., Chairman, John P. Clark Co. 124 South Easton Rd. Glenside, Pa.
- H. N. Ghenn, Secretary, American Viscose Corp. Marcus Hook, Pa.
- George J. Kaiser, Treasurer, Pennsylvania Forge Corp. Milnor & Bleigh Sts. Philadelphia 35, Pa.

PHOENIX CHAPTER

- E. J. Schwetz, Chairman, 1211 East Roosevelt Phoenix, Ariz.
- R. L. FISCHER, Secretary, 2307 North 30th Place Phoenix, Ariz.
- J. R. DECKER, Treasurer, 1227 East McLellan Phoenix, Ariz.

PITTSBURGH CHAPTER

- THOMAS I. MCCLINTOCK, Chairman Aluminum Co. of America Alcoa Bldg. Pittsburgh 19
- EARL L. WEAVER, JR., Secretary, Leeds & Northrup Co. 300 Mt. Lebanon Blvd. Pittsburgh 34
- LESTER C. HILL, Treasurer, 1615 Second St. Beaver, Pa.

PUGET SOUND CHAPTER

- W. L. Slosson, Chairman, 7601 Laurel Seattle 88, Wash.
- CLAUDE B. HOLDER, Secretary-Treasurer, 3017—36th Ave., S. W. Seattle 6, Wash.

PUGET SOUND—UNIVERSITY OF WASHINGTON GROUP

Edward G. Costello, Chairman, 1021 Costello Drive Kent, Washington

WILLIAM EARL ANDERSON, Secretary, 1650 S. W. 170th St. Seattle 66, Wash.

James V. Alger, Treasurer, 5411-B Keeport Pittsburgh 36

PURDUE CHAPTER

LESTER E. ALBAN, Chairman, 918 South 9th St. Lafayette, Ind.

Leonard J. Ewalt, Secretary-Treasurer, 3002 South St. Lafayette, Ind.

QUEBEC CHAPTER

G. LETENDRE, Chairman, Faculte Des Sciences Universite Laval Blvd. De L'Entente Quebec, Quebec

PEUL E. PELLETIER, Secretary-Treasurer, 23 Desy Ave. Quebec City, Quebec

RHODE ISLAND CHAPTER

J. D. Nelson, Chairman, Carpenter Steel Co. Box 1174 Providence, R. I.

J. J. Desonie, Secretary-Treasurer, 742 Broad St. Providence, R. I.

ROCHESTER CHAPTER

LEON C. KIMPAL, Chairman, Rochester Gas & Electric Corp. 89 East Ave. Rochester 4, N. Y.

James H. Brown, Jr., Secretary-Treasurer, 574 Flint St., Rochester 11, N. Y.

ROCKFORD CHAPTER

EDGAR C. WALLACE, Chairman, 208 Robert St. Rockford, Ill.

CLIFF SOPER, Secretary-Treasurer, 818 North Court St. Rockford, Ill.

ROCKY MOUNTAIN DENVER CHAPTER

FRED E. BLAIR, Chairman, Blair Engineering Co. 40th & Ulster Sts. Denver, Colo.

CLYDE O. PENNEY, Secretary, D & R G W R R Burnham Lab. W. 8th & Osage Denver 4, Colo.

John Golding, Treasurer, 3633 Osceola Denver 11, Colo.

ROCKY MT. COLORADO SCHOOL OF MINES CHAPTER

JACK L. SHUTEK, Chairman, 1120½ Washington Golden, Colo.

H. CRAIG ARGO, Secretary-Treasurer, SAE House Golden, Colo.

ROCKY MOUNTAIN PUEBLO CHAPTER

CHARLES E. BOWMAN, Chairman, 926 West Adams Pueblo, Colo. WALTER W. MUNN, Secretary-Treasurer, 2111 Elizabeth St. Pueblo, Colo.

ROME CHAPTER

Ernest Grider, Chairman, Utica Drop Forge & Tool Corp. Utica, N. Y.

JOHN F. PIETRAS, Secretary-Treasurer, Revere Copper & Brass, Inc. Rome, N. Y.

ST. LOUIS CHAPTER

JULIUS TURK, Chairman, 9775 Hastings Dr., Olivette 24, Mo.

HAROLD C. PFEFFER, Secretary, 5324-A Jamieson St. Louis

ARTHUR H. L. HUNNIUS, Treasurer, 6314 Hancock Ave. St. Louis 9

SAGINAW VALLEY CHAPTER

THOMAS E. LEONTIS, Chairman, Dow Chemical Co. Midland, Mich.

ALBERT A. MOORE, Secretary, 1727 South Sasse Rd. Route 4 Midland, Mich.

HAROLD R. WEGNER, Treasurer, Saginaw Heat Treating Co. 5801 Dixie Highway, Saginaw, Mich.

SAN DIEGO CHAPTER

THOMAS E. PIPER, Chairman,
Consolidated Vultee Aircraft Corp.
Dept. I-14, Bldg. 19
P. O. Box 1950
San Diego 12, Calif.

LAWRENCE J. HULL, Secretary, 3446 Yonge St., San Diego 6, Calif.

GEORGE D. CREMER, Treasurer, Research Division Solar Aircraft Co. Pacific Highway San Diego, Calif.

SAVANNAH RIVER CHAPTER

C. C. McBride, Chairman, 118 Marvin Dr., S. E. Aiken, S. C.

E. A. ORR, Secretary, 821 Heard Ave. Augusta, Ga.

L. H. EISEMAN, JR., Treasurer, Apt. 8 Country Club Apts. Augusta, Ga.

SOUTHERN TECHNICAL INSTITUTE CHAPTER

- Ronald Logan, Chairman, Southern Tech. Inst. Chamblee, Ga.
- Henry Almand, Secretary, 1917 College St. Macon, Ga.
- BRUCE DILLARD, Treasurer, 603 Webster St. Thomasville, Ga.

SOUTHERN TIER CHAPTER

- JOHN B. GIVEN, Chairman, I. B. M. Corp. Endicott, N. Y.
- Samuel C. Smith, Secretary-Treasurer, 264 Caldwell Ave. Elmira, N. Y.

SPRINGFIELD CHAPTER

- L. Brewster Howard, Chairman, 36 Druids Lane West Springfield, Mass.
- Francis D. Looney, Secretary-Treasurer, L and L Heat Treating Co. 349 Cold Spring Ave. West Springfield, Mass.

SYRACUSE CHAPTER

- Fred Hunter, Chairman, 1226 Cumberland Ave. Syracuse 10, N. Y.
- James O. Ochsner, Secretary, 226 Cleveland Ave. Syracuse 8, N. Y.
- Henry C. Holbert, Treasurer, 2935 South Salina St. Syracuse 5, N. Y.

TERRE HAUTE CHAPTER

- Burlin R. McMasters, Chairman, 1522 South 18th St. Terre Haute, Ind.
- EDWARD A. MACLEAN, Secretary, Rose Polytechnic Institute Terre Haute, Ind.
- Lawrence E. Simpson, Treasurer, 546 Monterey Ave. Terre Haute, Ind.

TEXAS CHAPTER

- Donald E. Wilson, Chairman, Cameron Iron Works, Inc. P. O. Box 1212 Houston 1, Tex.
- Curtis L. Horn, Secretary-Treasurer, 4604 Cedar Oaks Lane Bellaire, Tex.

TOLEDO CHAPTER

- LAWRENCE R. ALBRIGHT, Chairman, Industrial Heat Treating Co. 522 State St. Toledo, Ohio
- Calvin H. Cummings, Secretary-Treasurer, 634 Nicholas Ave. Toledo 9, Ohio

TRI-CITY CHAPTER

- PHILLIP E. GOETTSCH, Chairman, Route 1 Bettendorf, Iowa
- RICHARD B. MICLOT, Secretary-Treasurer, Riverside Foundry Co. Bettendorf, Iowa

TULSA CHAPTER

- PAUL OGDEN, Chairman, 1119 South Johnstone Bartlesville, Okla.
- William L. Smith, Secretary-Treasurer, 4630 South Evanston Tulsa, Okla.

UTAH CHAPTER

- J. N. CARTER, Chairman, 1549 Parkway Ave., Salt Lake City, Utah
- H. EDWARD FLANDERS, Secretary, University of Utah Met. Dept. Salt Lake City, Utah
- ROBERT O. KRON, Treasurer, 735 South 500 East Orem, Utah

VIRGINIA POLYTECHNIC INSTITUTE CHAPTER

- WILLIAM H. LEWIS, JR., Chairman, Virginia Technical Station Box 4558 Blacksburg, Va.
- BURTON C. BOESSER, II, Secretary, Virginia Tech. Station Box 2854 Blacksburg, Va.
- RICHARD A. FRITTS, Treasurer, Virginia Polytechnic Institute Virginia Technical Station Box 3654 Blacksburg, Va.

WARREN CHAPTER

- HAROLD O. RIPPLE, Chairman, R. F. D. 5, Box 12 Warren, Ohio
- Howard Blair, Secretary-Treasurer, American Welding & Mig. Co. Dietz Road Warren, Ohio

WASHINGTON CHAPTER

- MELVIN R. MEYERSON, Chairman, National Bureau of Standards Northwest Bldg., Room 103 Washington 25, D. C.
- JACK H. SCHAUM, Secretary-Treasurer, 7309 Romander Lane Chevy Chase, Md.

WEST MICHIGAN CHAPTER

- ROBERT L. SWEET, Chairman, Met. Eng. Dept. Michigan State University East Lansing, Mich.
- WARREN B. RICE, Secretary-Treasurer, 2113 Maffett St. Muskegon Heights, Mich.

WESTERN ONTARIO CHAPTER

Frank Miller, Chairman, Steel Master Tool Co. 6500 Tecumseh Rd. E. Windsor, Ontario

E. BACKMAN, Secretary, Canadian Motor Lamp Co., Ltd. Windsor, Ontario

RAYMOND E. BARTON, Treasurer, Canadian Mines Equipment Ltd. 596 Hamilton Rd. London, Ontario

WICHITA CHAPTER

Louis G. Montre, Chairman, 1801 W. 23rd, N. Wichita 4, Kan.

Charles E. Kimball, Secretary, 1109 South Inverness Wichita, Kan.

Harley E. Babst, Treasurer, 731 West 10th St. Wichita 2, Kan.

WORCESTER CHAPTER

HERBERT P. BERRY, Chairman, Thomas Smith Co. 288 Grove St. Worcester 5, Mass.

RALPH N. S. MERRITT, JR., Secretary-Treasurer, Olson Manufacturing Co. 100 Prescott St. Worcester 5, Mass.

YORK CHAPTER

Roy E. LIVINGSTONE, Chairman, 1717 Stanton St. York, Pa.

ARTHUR R. MILLER, Secretary, 983 East Philadelphia York, Pa.

PAUL D. STRUBHAR, Treasurer, R. C. A. Victor Div. Lancaster, Pa.